



# INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS (IGPP) LOS ALAMOS NATIONAL LABORATORY (LANL)

FY06 Call for Collaborative Research Proposals  
(Both New and Renewal Proposals)

Deadline for receipt: March 21, 2005

## 1. INTRODUCTION

The Institute of Geophysics and Planetary Physics (IGPP) at Los Alamos National Laboratory (LANL) is a branch of the University of California's Systemwide Institute of Geophysics and Planetary Physics. Its mission is to promote and coordinate basic research on the understanding of the origin, structure, and evolution of the Earth, the Solar System, and the Universe, and to develop the science base to predict future changes as they affect human life. As part of the mission, IGPP at LANL is committed to promoting and supporting high quality, cutting edge science in the areas of astrophysics, space physics, solid earth geoscience, and complex dynamical climate systems. These focus areas are selected based on their breadth of scientific challenges facing the international scientific community as well as on the strategic need to extend Laboratory scientific excellence. IGPP/LANL makes a special effort to promote and support new research ideas, which can be further developed through seed funding into major programs supported by federal or other funding sources. Collaboration between LANL and university scientists is viewed by IGPP as an effective arrangement to promote creativity and extend science beyond today's understanding.

The Regents of the University of California and the Director of the Los Alamos National Laboratory provide funds for collaborative research involving LANL and University principal investigators (PIs), i.e., in the form of a minigrant program. Graduate student and/or postdoc participation is an essential component of all approved minigrant projects. While many minigrants extend up to three years duration, IGPP issues minigrant awards on one-year basis with renewals decided as per scientific progress. In most cases, minigrants are dedicated to support salary and travel costs for the participating graduate student and/or postdoc, some equipment costs, and a minimal amount of support for the PIs. Successful proposals are **required** to include some form of matching support from their universities. Acceptable forms of matching support are the same as, but not restricted to, those accepted by the National Science Foundation or other Federal research funding agencies.

Proposals may be submitted from any US university. On average, 60% of all approved IGPP minigrants awarded at Los Alamos originate from non-UC campuses. Typical grants are \$25K-\$45K, per annum, and approximately 40-50 grants are issued each year.

Each proposal is required to have a University PI and a Laboratory PI. A University PI is any University scientist entitled by the University to be Principal Investigator on an extra-mural grant. A Laboratory PI is any Technical Staff Member (TSM). Visiting scientists, adjunct faculty and postdocs do not qualify as co-PI unless an exception is granted by the University.

This FY06 call is for collaborative research proposals in support of the research focus areas and focus area topics specified in Section 2 of this announcement.

## 2. SCIENTIFIC DISCIPLINES INCLUDED IN THIS CALL

IGPP has four focus research areas, included in this call for proposals:

- Astrophysics (Focus Leader: Richard Epstein [epstein@lanl.gov](mailto:epstein@lanl.gov))
- Space Physics (Focus Leader: Reiner Friedel [friedel@lanl.gov](mailto:friedel@lanl.gov))
- Solid Earth Geoscience (Focus Leader: Claudia Lewis [clewis@lanl.gov](mailto:clewis@lanl.gov))
- Complex Dynamical Climate and Environmental Systems (Focus Leader: Manvendra Dubey [dubey@lanl.gov](mailto:dubey@lanl.gov))

Each of these focus areas is directed by a focus leader (identified in parentheses) who is responsible for coordinating research efforts so that individual projects will benefit from the best available resources and expertise. Prospective grantees are encouraged to contact the respective focus leaders for information on technical scope of the focus area and/or visit the IGPP web site

<http://www.igpp.lanl.gov/> for additional information and answers to frequently asked questions.

The IGPP director and focus leaders have identified the following topics of interest, per focus area, as guidance for proposal preparation.

### **Astrophysics**

Proposals are solicited with emphasis on theoretical research, observational research, and instrumentation research. General interests are multidisciplinary projects at the boundaries between astrophysics and nuclear physics, particle physics, condensed matter physics, plasma physics, and/or general relativity. Use of LANL facilities is highly desirable, e.g., exploitation of the Milagro gamma-ray observatory.

The following specific topics are of interest:

- gamma ray astrophysics
- space instrumentation
- stellar dynamics
- neutron star and black hole physics
- physics of accretion disks
- cosmology and galaxy formation
- cosmic microwave background
- supernovae

### **Space Physics**

Proposals are solicited that advance theoretical research, computational research, and/or observational research into the plasma environment of the Earth's atmosphere and into processes that affect this environment. Research on the transport of plasma and energy from the Sun through interplanetary space to the Earth is also encouraged. These include the interaction of various plasma populations and the coupling of microscopic and macroscopic phenomena. The following topics are covered:

- solar dynamics responsible for the solar wind
- magnetohydrodynamics of the magnetosphere, ionosphere, and thermosphere
  - magnetospheric substorms
  - magnetotail current sheet dynamics
  - dusty plasmas
- magnetospheric models (near-Earth plasma sheet through into the inner magnetosphere) and their use of LANL data for either boundary conditions, assimilation or validation

- physics affecting the performance and reliability of space-borne and ground-based technological systems
  - statistics and predictability of magnetospheric substorms
  - physics governing satellite to ground communications

In addition this year we solicit proposals covering the following areas:

- solar wind interaction with planetary magnetosphere (“Planetary Space physics”) such as Jupiter or Saturn
- remote sensing of planetary geology and climate by planetary orbiters at the Moon and Mars.

Leveraging against LANL facilities and databases, e.g., linkage to multi-cluster satellite experiments or computer simulation codes, is strongly encouraged.

### **Solid Earth Geoscience:**

This focus supports a breadth of basic research concerning planetary surfaces and interiors, including numerical, experimental, and field studies of the structure, properties, processes, and dynamics of terrestrial and giant planets. It is strongly recommended that proposals exploit unique LANL resources, such as high-performance computing resources or the Los Alamos Neutron Science Center (LANSCE).

The following areas reflect continuing IGPP interest—

- Planetary interiors
- Planetary tectonics
- Earth's interior--composition and state, and rheology of crust, lithosphere, and mantle
- Geomagnetism and electromagnetics
- Dynamics of lithosphere and mantle
- Tomography
- Heat generation and transport

For FY06, we are particularly interested in innovative research projects in areas of current, strong international scientific interest such as the following:

- New techniques in passive (imaging) or active (e.g., lidar, radar) remote sensing and digital data analysis for the geosciences
- Elastic strain measured by GPS or InSAR for applications in natural hazards and hydrology
- Strain localization in geomaterials
- Earthquake seismology and seismotectonics, including rupture processes, rheology and friction of fault zones, and earthquake clustering
- Dynamics and elasticity of Earth materials
- Transient and steady-state behavior in geologic and hydrologic processes, including multi-phase fluid flow in porous and fractured media
- Exploiting low-temperature thermal evolution of geomaterials or effects of ionizing radiation on geomaterials
- Dynamic interactions between climate, tectonics, and surface processes, including mechanics of erosion

### **Complex Dynamical Climate and Environmental Systems**

This focus area emphasizes the nonlinear dynamics and multi-equilibria of the coupled atmosphere, (liquid and ice covered) ocean, hydrosphere, and biosphere of planet Earth, on scales ranging from urban canopies to basin and global extent. General interests are studies that extend our understanding of the causes of temporal variations of ocean and atmospheric basin scale oscillations;

rapid climate change on both global and regional scales; climate forcings by greenhouse gases and aerosols, and the physics and chemistry governing multiscale interactions extending from the urban canopy to basin scales. Use of LANL facilities and data bases (e.g., use of LANL's GIS facilities, and/or data bases of the ARM program, and from remote sensing platforms) are strongly encouraged.

Specific topics of interest in FY06 include the following:

- dynamics governing abrupt changes in the atmosphere-ocean system
- high-resolution coastal ocean and sea ice modeling
- physics and biogeochemistry governing formation, transformation, deposition, and spatial heterogeneity of atmospheric aerosols, including the role of clouds
- nonlinear dynamics of moving cyclones
- physics governing air-sea interactions
- high-resolution modeling of lightning and rainfall, in complex terrain
- physics, chemistry, and surface processes governing forest fires in complex terrain
- physics and stochastic characterization of Large Eddy Simulations (LES) of chemical and biological transport in urban canopies and other regions of strong heterogeneity
- inverse nested modeling, including DNS, LES, and forward modeling, in complex terrain
- statistical and model-based interpretation of paleoclimatic data
- Observations and process modeling of components of the carbon cycle, from the local to global scale

### **SPECIAL LARGE PROJECT COMPETITION**

In addition to the above projects, IGPP is soliciting proposals for a single project in one of the focus areas for up to \$100K for particularly innovative research. Examples of such needs are:

- Concentration of effort on a specific topic that needs rapid advance
- A multi-campus/laboratory project
- An important project requiring salary for Laboratory PI
- A project requiring specific funds for laboratory apparatus, field trips, etc.

The intent is for IGPP to support a single project whose results would be of considerable interest to the community at large and to the Laboratory, and could only be completed with a higher level of financial support. The project would be supported for up to three years (assuming adequate yearly progress and available IGPP funding). Interested investigators should directly contact the IGPP Director for additional information and assistance.

### **3. FUNDING INTERVAL AND IN-KIND CONTRIBUTIONS**

The funding interval is October 1, 2005, through September 30, 2006. PIs should note however, that the availability of funds is contingent upon the date the contract is awarded by the LANL Contracts Office, which may be up to several months after the start of the fiscal year for new proposals. The University of California (UC) waives overhead for this program. Non-UC institutions are encouraged to do the same;

if this is not possible, some alternate in-kind contribution is expected. In many cases, proposals may be submitted as multi-year efforts, usually with a maximum of three years. Renewals for the second or third year are determined based on progress during the previous year and timely delivery of progress reports.

#### 4. GUIDANCE: PREPARATION OF NEW PROPOSALS

The following format is recommended:

**Cover Sheet**, to include on one page:

Title of proposed project

Name of University Campus

Is this a new proposal or renewal?

If you are submitting a proposal for renewal, please indicate if second year renewal or third year renewal.

Which IGPP focus area(s) is this proposal most relevant to?

- Astrophysics
- Space Physics
- Solid Earth Geosciences
- Complex Dynamical Climate and Environmental Systems

Proposed start date, and proposed duration of project (usually 1, 2, or 3 years).

Name, title, address, email address, and phone number for both PIs.

Name and email of postdoc and/or graduate student(s), if known.

**Main Body** (including budget information)

Use the following outline in formatting the main body; please limit to **five total pages** of text (for Sections I through IX), plus figures and a budget page:

- I. Title of project, and short abstract
- II. Principal investigators and team, including all contact information
  - i. University PI: address, telephone number, fax, and email address
  - ii. LANL PI: Group, telephone number, fax and email address
  - iii. Name and email address of participating postdoc and/or graduate student(s), if known
- III. Start date, and project duration
- IV. Objectives
- V. Background
  - i. History of problem
  - ii. Scientific debate
  - iii. Hypotheses to test
  - iv. Why now?
- VI. Approach
  - i. Theoretical, numerical, or experimental activity
  - ii. Methods used (describe comprehensively)
  - iii. Any relevant leveraging or necessary coordination, e.g., other projects or facilities
- VII. Resources to be used in the project
  - i. Resources at Los Alamos
  - ii. Resources at the University
  - iii. Other Resources
- VIII. Statement of Work
  - i. Tasks to be performed
  - ii. Milestones
  - iii. Deliverables
  - iv. Schedule of visits (and work performed) at LANL or Campus
- IX. References

- X. Proposing Team
  - i. Role of University PI
  - ii. Role of Laboratory PI, including efforts at mentoring
  - iii. Role of postdoc or graduate student
    - a. Identify if MSc or PhD project, if grad student
  - iv. Other participants
- XI. Significance and timeliness
  - i. What is the significance of the project? One way of getting at this is to answer the question, "When this project is finished and published, who will use the results?" This question should be dealt with explicitly, with significant input from the Laboratory PI.
  - ii. Why should this project be funded now instead of, e.g., next year?
- XII. Budget summary
  - i. Indicate separately those amounts to be spent on campus(es) and at LANL:
    - a. Salaries. Details of computations to be provided.
    - b. Supplies
    - c. Computer usage and related costs
    - d. Travel
    - e. Equipment
    - f. Other expenses
    - g. TOTALS: for campus, for laboratory
  - ii. Supplemental budget information (including a section on current and pending support for research from other sources)
- XIII. Biographical sketches of PIs including already identified graduate students, ~1 page each.

While IGPP supports publication page charges, such charges are NOT to be included in the proposed budget. PI's are asked to send an email to the IGPP director at which time funding is needed to cover page charges for publications associated with IGPP research.

## 5. GUIDANCE: PREPARATION OF RENEWAL PROPOSALS

Proposals submitted for renewal must contain the following information:

1. Cover Sheet, to include the same information as for a new proposal
2. Copy of original proposal
3. Statement of progress during previous year
4. Revised work plan for FY06
5. Updated declaration of other ongoing research projects related to the IGPP funded project
6. Detailed budget request, noting any changes from the original proposal.

Renewal depends significantly on demonstrating a strong collaborative element in the work performed. The PIs should be reminded that, if the renewal proposal is recommended for funding, the annual progress report must be submitted by **October 7, 2005** and accepted by IGPP, before funding will be transferred from LANL to the University.

The statement of progress during the previous year to be reported with the renewal proposal should summarize theoretical, numerical, and/or experimental activities. Visits and exchanges of personnel between the University and Laboratory should be documented, and progress of the graduate student towards a PhD and/or postdoc towards completion of the project should be included. The progress should also include a list journal and other articles published or submitted; journal and other articles in preparation; technical presentations; and efforts to secure future funding from other agencies.

Note that the minigrant reporting requirement, noted below, is an expanded version of the progress statement to be included in the renewal proposal.

## 6. MINIGRANT REPORTING REQUIREMENT

Minigrant project reports, applicable to both the annual progress report and final report, must be submitted to IGPP **by close of business, October 7, 2005**. The Contracts Office of the Los Alamos National Laboratory will be provided a copy of the report. Renewal proposals will not be funded without submission and acceptance of the progress report by IGPP and the Contracts Office.

A final report summarizing all findings and results of the project will be required upon completion of the project. The PIs should note that if a final report is submitted at the completion of a given year, an annual report for that year is not necessary. We would appreciate help from the PI in notifying IGPP of all publications citing IGPP support, even if these publications appear after the expiration of the award.

Annual progress reports as well as the project final report should be prepared using the same format:

- Project objectives and brief summary of work plan (maximum half page)
- Summary of research results to-date (1-3 pages), plus any relevant graphics
- Any new insights or challenges in meeting project objectives
- Any complications in meeting project objectives
- List of publications, including submissions
- List of Presentations
- Name of grad student and/or postdoc
- Progress towards PhD, if graduate student
- Documentation of visits to LANL and/or to University
- LANL and/or facilities used in the research
- Budget details
- Efforts to secure further funding from other agencies.

## 7. PROCESS OF REVIEWING, SELECTING OR REJECTING PROPOSALS

All new proposals undergo peer review by scientists in the broad research community who are familiar with the research topic. Reviewers are given a set of questions to address, i.e., concerning scientific merit, risks in reaching objectives, LANL/University collaboration, growth potential of research topic, quality of participants, and budget.

With only unusual exceptions, renewal proposals are reviewed by the IGPP Director and focus leaders, and input is also solicited from relevant members of IGPP's External Advisory Committee.

Final decisions on acceptance and/or denial of all proposals will be reached during the annual meeting of IGPP's External Advisory Committee, typically in May or early June.

In preparing proposals, PIs should be aware of the following reasons why some proposals are rejected:

- Objectives and background are unclear or inadequately argued.
- Methods are inadequately described or do not reflect state-of-the-art.
- Approach is not convincing enough to satisfy the objectives.
- Collaboration between Laboratory PI and University PI is not obvious.
- Important and relevant LANL facilities are not considered or exploited.
- No graduate student or postdoc is involved in the research.

- Lack of commitment by the Laboratory PI to the research or mentoring process.
- Subject matter is not relevant to IGPP's scientific interests or research priorities.

## 8. SECURITY CONSIDERATIONS

Classified work is not supported under the IGPP minigrant program. Therefore, all research facilities (including office space and computing) conducted under IGPP funding will be carried out in unclassified space. There is no prejudice based on race, gender, or nationality.

## 9. MAILING INSTRUCTIONS AND DEADLINE

Proposals (title, abstract page, main body including budget) must be submitted by email from the email account of either the LANL or University PI, to be received by IGPP no later than **March 21, 2005**.

Send to: Ms. Debra S. Saiz ([dsaiz@lanl.gov](mailto:dsaiz@lanl.gov))  
with copy to: Gerald Geernaert ([geernaert@lanl.gov](mailto:geernaert@lanl.gov)).

Proposals may also be submitted in hard copy, with a disk, to the IGPP Center Director, to be received **by close of business, March 21, 2005**.

IGPP Center  
Los Alamos National Laboratory  
P.O. Box 1663 MS C305  
Los Alamos, NM 87545

Federal Express Address:

IGPP Center  
Los Alamos National Laboratory  
Warehouse SM 30 – MS C305  
Bikini Atoll Road  
Los Alamos, NM 87545

**Mandatory for proposals involving the University of California:** Please send an information copy to:

Professor Jean-Bernard Minster  
Systemwide Director, IGPP  
Scripps Institution of Oceanography/UCSD  
IGPP MC 0225  
9500 Gilman Drive  
La Jolla, California 92093-0225

Federal Express Address for Professor Minster:

IGPP Rm 2210  
Scripps Institution of Oceanography  
8765 Biological Grade, EAMS Code 6317  
La Jolla, CA 92037



Signature pages are no longer required with the submittal of the proposal. IGPP will request signatures from the co-PI's, and their respective institutional official, i.e., if and only if IGPP recommends the proposal for funding. Before initiation of a PR, signatures will be required from the University Department Chair or Director of campus-organized research unit, Management Service Officer or Fiscal/Budget Person, and Contract and Grants Officer; for LANL, the Proposing Laboratory PIs must receive approvals from Group Leaders.

**FOR FURTHER INFORMATION:**

IGPP Office

<http://www.igpp.lanl.gov/>

1-505-667-0920

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